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United States Patent

[19]

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[54] **POLY(ALKYLENE OXIDE) AMINO ACID COPOLYMERS AND DRUG CARRIERS AND CHARGED COPOLYMERS BASED THEREON**

5,091,176 2/1992 Braatz et al. 424/78.17
5,219,564 6/1993 Zalipsky et al. 424/78.17

OTHER PUBLICATIONS

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Jeon et al., *J. Polym. Sci. Part A Polym. Chem.*, 27, 1721-30 (1989).

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Cho et al., *Makromol. Chem.*, 191, 981-91 (1990).

[21] Appl. No.: **23,069**

Kimura et al., *Makromolecules*, 16, 1023-4.

[22] Filed: **Feb. 25, 1993**

Ouchi et al., *J. Macromol. Sci.-Chem.*, A24(9), 1011-32 (1987).

Bos et al., *Acta Pharm. Technol.*, 33(3), 120-5 (1987).

Pretula et al., *Makromol. Chem., Rapid Commun.*, 9, 731-7 (1988).

Graham et al., *Makromol. Chem., Macromol. Symp.*, 19, 255-73 (1988).

Imai et al., *Makromol. Chem., Rapid Commun.*, 5, 47-51 (1984).

Wang et al., *J. Macromol. Sci.-Chem.*, A26(2-3), 505-18 (1989).

Related U.S. Application Data

[60] Division of Ser. No. 726,301, Jul. 5, 1991, Pat. No. 5,219,564, which is a continuation-in-part of Ser. No. 549,494, Jul. 6, 1990, abandoned.

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[51] **Int. Cl.⁶** **A61K 31/74**; A61K 31/765; A61K 31/785

[57] ABSTRACT

[52] **U.S. Cl.** **424/78.17**; 424/78.08

[58] **Field of Search** 424/78.17, 78.08

[56] References Cited**U.S. PATENT DOCUMENTS**

4,179,337	12/1979	Davis et al.	.....	530/816
4,275,000	6/1981	Ross	.....	424/85.8
4,388,441	6/1983	Katz	.....	525/54.1
4,460,560	7/1984	Tokes et al.	.....	424/78.17
4,680,338	7/1987	Sundoro	.....	525/54.1
4,843,147	6/1989	Levy et al.	.....	424/85.8
4,863,735	9/1989	Kohn et al.	.....	424/422
4,892,733	1/1990	Bichon et al.	.....	424/422
4,919,928	4/1990	Jansen et al.	.....	424/85.8
4,931,287	6/1990	Bae et al.	.....	424/484

Copolymers of poly(alkylene oxides) and amino acids or peptide sequences are disclosed, which amino acids or peptide sequences have pendant functional groups that are capable of being conjugated with pharmaceutically active compounds for drug delivery systems and cross-linked to form polymer matrices functional as hydrogel membranes. The copolymers can also be formed into conductive materials. Methods are also disclosed for preparing the polymers and forming the drug conjugates, hydrogel membranes and conductive materials.

2 Claims, 1 Drawing Sheet

